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Forest Insect and Disease Management

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BIOLOGICAL
EVALUATION R2-79-5

DWARF MISTLETOE SURVEYS

Bureau of Land Management,
Craig District,
Kremmling Resource Area
Colorado

MAY 1979

Rocky Mountain Region

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ABSTRACT

During 1978 presuppression surveys for dwarf mistletoe were conducted by the BLM over 7,000 acres (and 397 stands) of lodgepole pine type in the vicinity of Independence Mountain, northwest of Cowdrey, Colorado.

Sixty-two representative stands were processed through the RMYLD program to estimate total merchantable yields with and without dwarf mistletoe control treatments. Recommendations for scheduling priority of treatment of these stands is presented.

INTRODUCTION

Lodgepole pine dwarf mistletoe, *Arceuthobium americanum* Nutt. ex. Engel., is the most damaging disease agent of lodgepole pine, *Pinus contorta* Dougl., in the Rocky Mountain Region. The greatest damage caused by the disease is reduced height and diameter growth of infected trees. In addition to reduced increment, infection causes increased mortality, lowered timber quality, reduced seed production and increased susceptibility to other damaging agents.

Dwarf mistletoe infected trees usually occur in distinct groups or centers of various sizes and shapes scattered through a stand. In the Rocky Mountain Region, there are thousands of acres of lodgepole pine that are in need of overstory removal and precommercial or commercial thinning. In addition stands not managed primarily for timber production could benefit from dwarf mistletoe control by promoting a vigorous, more healthy forest in which other resource values would be enhanced. Management decisions must be made for each of these stands. Prior to the development of a silvicultural prescription, the land manager must have a complete description of each stand, including age, structure, stocking, and site index, together with reasonably accurate information on dwarf mistletoe distribution and intensity (if present). These kinds of data will also aid in establishing priorities for treatment of various stands.

At the request of the Craig District, Bureau of Land Management, Craig, Colorado, FI&DM personnel provided field training to BLM crews during 1977 to conduct dwarf mistletoe presuppression surveys in anticipation of proposed control projects in north central Colorado. During 1978 the Craig District conducted surveys to determine the distribution and intensity of lodgepole pine dwarf mistletoe in lodgepole pine stands on Independence Mountain, north central Colorado (T 11, 12 N, R 80, 81 W - north and west of Cowdrey, Colorado - Figure 1). The gross area included in the survey was 7,000 acres. The purpose of the survey was to identify and classify management units in need of dwarf mistletoe control that could be accomplished through timber sales and timber stand improvement work (1, 4, 5).

SURVEY PROCEDURE

Field data collection by BLM personnel included the installation and recording of tree data on variable radius plots (BAF-20) at

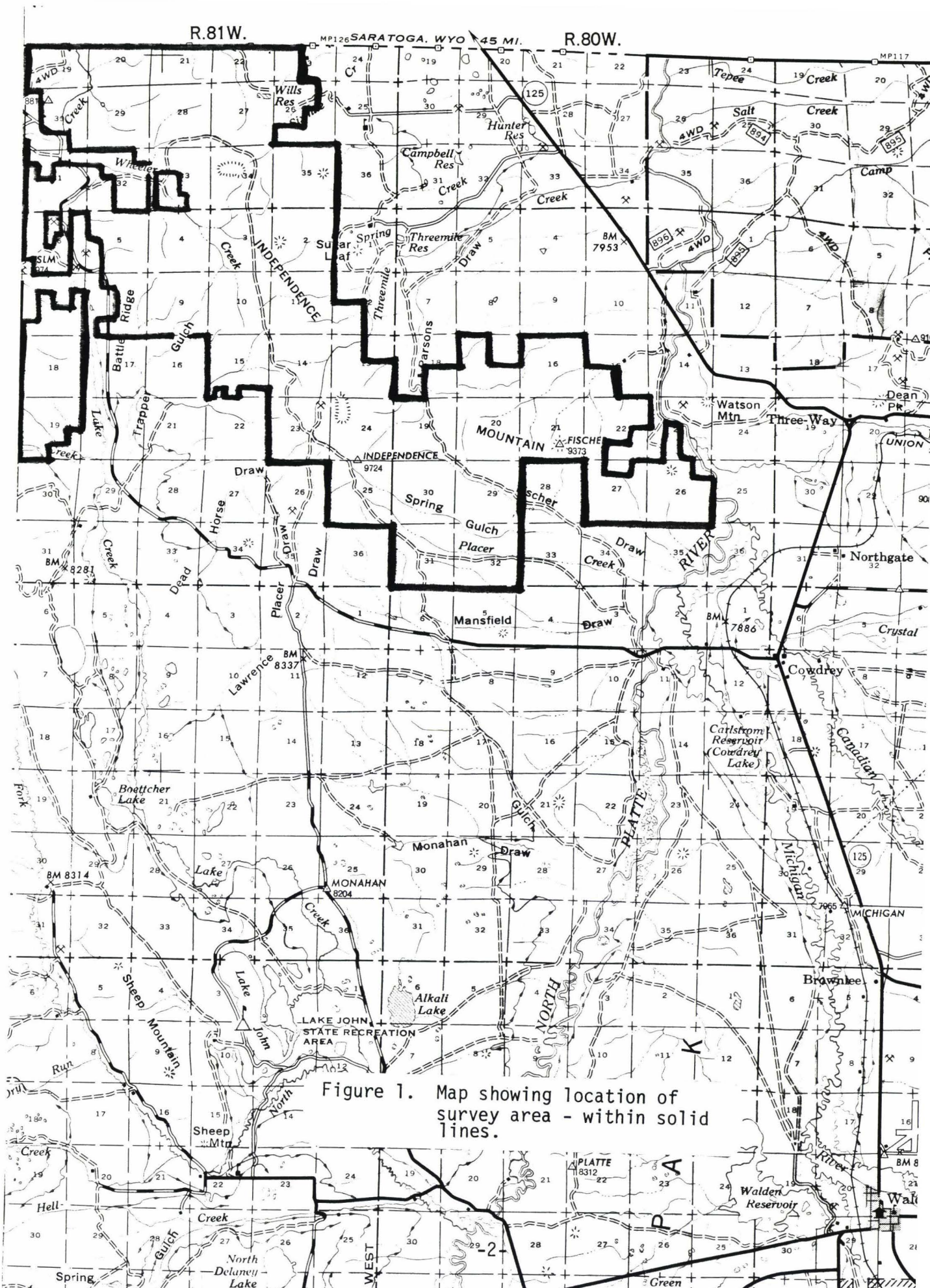

Figure 1. Map showing location of survey area - within solid lines.

a sampling intensity of one plot per 20 acres. Information recorded included stand number, plot number, site index, tree species, diameter at breast height (d.b.h.), total height (feet) and dwarf mistletoe rating (DMR) (3). Other information recorded included stand accessibility, general stand condition and multiple use considerations. A total of 397 stands were sampled.

DATA ANALYSIS

Data analysis and evaluation were completed by Dave Johnson. Individual tree data were summarized for each plot and stand averages computed. Non-lodgepole type stands were excluded from final analysis. Sixty-two lodgepole pine stands were selected that were representative of stands on Independence Mountain. These were processed through the Rocky Mountain Yield (RMYLD) program (2) to estimate cubic-foot volumes for each stand with and without dwarf mistletoe control treatments. Specifications included in the program were as follows:

1. Merchantable cubic foot volume was computed for all trees 6.0 inches d.b.h. and larger, to a 4.0 inch top. Board foot volume was computed for trees 6.5 inches d.b.h. and larger, to a 6.0 inch top. Average stand d.b.h. had to be 8.0 inches to be classed as sawtimber at final harvest and show a yield.

2. Removals were programmed only if total yields were at least 320 cubic feet and 1,500 board feet per acre.

3. Initial thinning from above was allowed only in stands with a dwarf mistletoe rating of 3.0 or less. An initial precommercial thinning was allowed; however, no additional noncommercial thinnings were allowed.

4. Final harvest age was programmed at 120 years.

5. Growing stock level for initial thinning and intermediate cuts was set at 80.

6. Interval between intermediate cuts in the overstory was 40 years.

7. All cuts were planned from above with emphasis on the removal of dwarf mistletoe infected trees.

RESULTS

Summaries for each of 62 stands are presented in Table 1. Stand numbers were supplied by BLM. Predicted total yields for each stand are given in merchantable cubic feet and board feet for sawtimber. Due to the high dwarf mistletoe rating of 33 stands (DMR greater than 3.0), no overstory removal treatment was planned. Predicted yields for these stands were the same regardless of treatment; whereas, stands 16, 29, 34, 84, 130, 182, 250 and 293 showed considerable increases in sawtimber volume (bd. ft.) as a result of one or two intermediate cuts to reduce dwarf mistletoe infected trees in the overstory (Table 1 - stands noted by asterisk). Stand 250 had no dwarf mistletoe present but did benefit from the intermediate cut because of the reduction in basal area and subsequent increased growth of the residual stand.

It is also interesting to compare the differences in predicted sawtimber volumes (bd. ft.) for stands 178, 243, and 293. Stand 178 with an initial DMR of 4.0 produced a greater yield (5,700 bd. ft.) than stand 293 with a DMR of 1.7 (no bd. ft. volume). This apparent anomaly can be explained by the fact that stand 178 had greater mortality due to the higher DMR and subsequently the remaining trees in the stand responded to this natural thinning. The predicted average stand d.b.h. at 120 years was 8.1 (sawtimber-size); whereas stand 293 with lower DMR stagnated and reached only a d.b.h. of 7.7 (not sawtimber-size). Stand 243 with an initial DMR of 1.8, in comparison with stand 293, averaged 10.5 inches d.b.h. at 120 years thus indicating a much greater sawtimber volume (Table 1).

RECOMMENDATIONS

In order for the Craig District to obtain the greatest benefit from the survey information and projected stand yields, the following recommendations are presented:

1. The highest priority work should be scheduled in stands 16, 29, 34, 84, 130, 182, 250 and 293 since dwarf mistletoe ratings of these stands (range from 0 to 3.0) are within acceptable levels for treatment and other stand criteria are favorable. Most of the remaining stands have now or will soon reach a point where treatment will be ineffective.

Table 1. Summary of stand characteristics and predicted merchantable yields for 62 lodgepole pine stands, Independence Mountain, Colorado

							Predicted Yields - Total					
							No Treatment			Treatment		
Stand No.	Site Index	Stand Age	Stand d.b.h.	Stand height	Stems/ acre	Stand DMR	Merch. Vol. Cu. Ft.	Sawtimber Vol. Bd. Ft.	Final d.b.h.	Merch. Vol. Cu. Ft.	Sawtimber Vol. Bd. Ft.	Final d.b.h.
8	60	50	6.1	34.0	248	6.0	0	0	6.1	0	0	6.1
11	61	70	7.4	45.6	113	0	2,640	12,100	13.1	2,640	12,100	13.1
12	59	70	5.2	43.0	534	3.6	2,450	10,100	8.1	2,450	10,100	8.1
14	56	70	5.3	42.5	130	3.0	1,290	5,500	10.9	1,290	5,500	10.9
*16	57	60	4.2	39.7	739	2.8	2,690	0	7.4	2,580	10,600	7.4
18	50	50	3.0	27.5	832	4.5	510	0	5.9	510	0	5.9
19	56	60	3.8	35.8	755	4.7	740	0	6.1	740	0	6.1
20	56	70	5.9	41.7	479	2.0	3,580	12,800	9.8	3,580	12,800	9.8
23	56	60	5.2	35.0	207	5.0	440	0	7.7	440	0	7.7
27	58	70	5.4	40.9	254	6.0	0	0	5.4	0	0	5.4
*29	56	50	3.5	33.3	1174	0.8	3,630	0	6.9	3,960	13,400	9.7
31	59	80	7.6	48.3	142	0	2,700	11,900	11.7	2,700	11,900	11.7
32	53	70	6.3	39.3	301	2.6	2,330	9,700	9.6	2,140	8,900	10.1
*34	57	50	3.8	31.6	917	1.7	2,840	0	7.1	3,730	12,800	10.1
37	56	60	5.4	34.6	371	5.4	400	0	6.7	400	0	6.7
42	57	60	5.4	33.6	445	5.1	710	0	7.1	710	0	7.1

* Indicates stands that should receive the highest priority for treatment.

Table 1. - Continued

Predicted Yields - Total

Stand No.	Site Index	Stand Age	Stand d.b.h.	Stand height	Stems/ acre	Stand DMR	No Treatment			Treatment		
							Merch. Vol. Cu. Ft.	Sawtimber Vol. Bd. Ft.	Final d.b.h.	Merch. Vol. Cu. Ft.	Sawtimber Vol. Bd. Ft.	Final d.b.h.
43	59	190	11.3	75.0	29	5.5	700	3,100	11.3	700	3,100	11.3
48	56	30	2.3	19.7	2030	6.0	0	0	2.3	0	0	2.3
49	60	70	5.0	43.6	509	0.6	4,440	10,200	9.1	4,440	10,200	9.1
55	57	90	7.3	47.0	173	0	2,370	9,900	10.2	2,370	9,900	10.2
59	51	90	5.8	44.7	464	1.6	2,540	0	8.0	2,540	0	8.0
83	58	50	5.4	29.3	289	0	4,060	17,500	11.6	4,060	17,500	11.6
*84	60	40	3.1	28.7	1011	0.8	3,970	0	7.4	4,630	16,200	10.5
104	68	50	4.2	37.9	693	3.0	2,940	12,100	8.2	3,140	13,400	10.6
107	68	70	6.3	47.7	270	0.1	4,970	21,300	11.5	4,970	21,300	11.5
112	61	60	5.5	36.9	250	0.6	3,800	16,400	11.5	3,800	16,400	11.5
127	58	70	3.0	39.7	1768	1.1	1,570	0	5.7	2,720	0	8.0
*130	63	60	4.7	41.9	825	0.8	5,310	0	7.7	4,520	19,000	10.4
133	68	50	3.6	37.0	987	4.8	750	0	6.0	750	0	6.0
136	55	70	6.4	42.0	226	3.8	1,710	7,200	10.2	1,710	7,200	10.2
139	61	70	5.2	40.8	413	6.0	0	0	5.2	0	0	5.2
142	55	80	6.2	47.5	379	1.5	3,590	12,700	9.3	3,590	12,700	9.3

Table 1. - Continued

Predicted Yields - Total

Stand No.	Site Index	Stand Age	Stand d.b.h.	Stand height	Stems/ acre	Stand DMR	No Treatment			Treatment		
							Merch. Vol. Cu. Ft.	Sawtimber Vol. Bd. Ft.	Final d.b.h.	Merch. Vol. Cu. Ft.	Sawtimber Vol. Bd. Ft.	Final d.b.h.
145	58	60	3.8	34.6	1007	4.1	1,310	0	6.5	1,310	0	6.5
149	46	50	4.2	26.1	870	4.0	620	0	6.1	620	0	6.1
154	56	50	3.7	31.1	780	5.1	0	0	5.5	0	0	5.5
157	56	90	5.4	48.7	248	5.7	410	0	6.1	410	0	6.1
160	54	60	5.2	36.7	413	6.0	0	0	5.2	0	0	5.2
161	41	60	3.2	26.2	725	6.0	0	0	3.2	0	0	3.2
162	56	50	3.3	32.7	914	6.0	0	0	3.3	0	0	3.3
165	79	60	5.0	50.6	582	2.0	6,170	25,300	11.3	6,170	25,300	11.3
168	50	60	4.5	33.3	416	3.9	1,150	0	7.7	1,150	0	7.7
173	48	50	3.3	26.2	664	5.7	0	0	3.9	0	0	3.9
174	60	50	5.2	36.1	482	4.6	1,050	0	7.7	1,050	0	7.7
178	57	60	4.5	37.2	403	4.0	1,390	5,700	8.1	1,390	5,700	8.1
*182	56	50	3.9	33.0	1132	1.5	3,010	0	6.9	3,860	13,500	10.0
187	65	70	5.5	46.5	462	2.4	3,690	13,900	10.1	3,690	13,900	10.1
187A	47	60	4.0	31.0	188	5.6	0	0	5.8	0	0	5.8
206	60	60	4.8	37.3	291	4.1	1,290	5,300	9.0	1,290	5,300	9.0

Table 1. - Continued

Predicted Yields - Total

Stand No.	Site Index	Stand Age	Stand d.b.h.	Stand height	Stems/ acre	Stand DMR	No Treatment			Treatment		
							Merch. Vol. Cu. Ft.	Sawtimber Vol. Bd. Ft.	Final d.b.h.	Merch. Vol. Cu. Ft.	Sawtimber Vol. Bd. Ft.	Final d.b.h.
210	58	70	5.9	40.4	139	1.3	2,030	8,900	11.5	2,030	8,900	11.5
219	57	60	3.9	38.3	1395	3.1	1,980	0	6.5	1,980	0	6.5
220	60	70	12.0	45.0	25	5.0	380	1,900	15.7	380	1,900	15.7
224	56	90	6.8	49.9	390	1.3	3,710	11,400	9.2	3,710	11,400	9.2
243	64	70	5.7	52.5	559	1.8	5,090	18,200	10.5	5,090	18,200	10.5
*250	60	80	5.1	49.9	684	0	4,560	0	7.3	3,960	16,400	9.2
292	51	80	3.9	40.0	728	6.0	0	0	3.9	0	0	3.9
*293	58	70	4.4	40.2	573	1.7	3,150	0	7.7	3,010	12,300	8.6
295	65	70	6.5	46.2	173	3.2	2,040	8,900	11.4	2,040	8,900	11.4
297	57	80	5.4	43.1	461	3.6	2,210	0	7.9	2,210	0	7.9
300	56	80	4.6	42.5	347	5.5	440	0	6.1	440	0	6.1
302	46	130	6.3	50.0	162	5.9	520	0	6.3	520	0	6.3
305	68	90	8.6	56.3	134	0	2,930	13,000	11.9	2,930	13,000	11.9
330	77	80	7.8	59.4	273	2.6	4,840	17,200	12.1	4,840	17,200	12.1

2. Stands with infected overstory where regeneration is between 10 and 20 years old, should be treated as soon as possible to reduce infection of regeneration.

3. Stands where predicted merchantable yields are very low or will not reach sawtimber-size (8.0 inches d.b.h. or greater) should probably be planned for post- or pole-sales and nonmerchantable material destroyed. The emphasis should be to establish disease-free regeneration.

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